Journal of Cleaner Production 207 (2019) 630–644

Contents lists available at ScienceDirect

Journal of Cleaner Production

journal homepage: www.elsevier.com/locate/jclepro

Good practices in local climate mitigation action by small and medium-sized cities; exploring meaning, implementation and linkage to actual lowering of carbon emissions in thirteen municipalities in The Netherlands

Richard F. Boehnke [a], Thomas Hoppe [b, *], Han Brezet [c, f], Kornelis Blok [d, e]

[a] Delft University of Technology, Faculty of Technology, Policy and Management (TPM), Delft, the Netherlands
[b] Delft University of Technology, Faculty of Technology, Policy and Management (TPM), Department of Multi-Actor Systems, Delft, the Netherlands
[c] Delft University of Technology, Faculty of Industrial Design Engineering, Department Design Engineering, Delft, the Netherlands
[d] Delft University of Technology, Faculty of Technology, Policy and Management (TPM), Department of Energy Systems and Services, Delft, the Netherlands
[e] Ecofys, a Navigant Company, Utrecht, the Netherlands
[f] Aalborg University, Department of Planning, Aalborg, Denmark

ARTICLE INFO

Article history:
Received 2 January 2018
Received in revised form
16 August 2018
Accepted 30 September 2018
Available online 3 October 2018

Keywords:
Climate policy
Climate action
Local government
Climate change mitigation
Governing by enabling
Good practice

ABSTRACT

Cities around the world are gearing up to play a major role in climate change mitigation. However, concrete results – significant emissions reductions, expected from cities committed to mitigating climate change, are currently conspicuously absent. While there are several good practice guides available for large/mega cities there are little available for small and medium-sized ones (SMCs). In this paper the main research questions are, "When exploring local climate mitigation action among multiple small- and medium-sized cities, what actions are perceived as good practices?", and "Are there any demonstrable effects linking them to achieving climate mitigation targets, and is this monitored?" A multiple case study research approach, using quali-quantitative mixed methods with multiple types of data sources, was used to analyze thirteen SMCs in the Netherlands. Results revealed twenty six good practices, with the majority exhibiting the characteristics of governing by enabling. However, no evidence was found that these good practices had been embedded in indicators or protocols, nor that they led to actual GHG emission reduction. In addition, action plans were found to be incomplete, in particular regarding implementation, and municipalities were found to work in isolation, with little inter-municipal collaboration. Moreover, whereas a monitor of local climate mitigation performance exists – using output and outcome indicators - it was found to be hardly known nor used among local policy makers. The results reveal a need to learn from good practices, to develop indicators that mirror these practices, and integrate them into local climate mitigation performance measurement tools. Currently, this is not the case, making it difficult to monitor local climate mitigation performance and progress vis-à-vis commitments made regarding the Paris Agreement.

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1. Introduction

In 2015 countries across the World adopted the Sustainable Development Goals (SDGs), a new sustainable development agenda. By doing so they targeted to end poverty, to protect the planet, and to ensure prosperity for all (Nations, 2018b). The SDGs Agenda acknowledges the importance of cities in sustainable development, and includes urban goals, in particular on sustainable cities and communities. The SDGs seek to integrate various sustainability related agendas into one framework for comprehensive action, and cover many of the goals initially set in Local Agenda 21 and the Millennium Goals, but in more synchronized ways (Fenton and Gustafsson, 2017). Among the Sustainable Development Goals it also covers climate action, and clean and affordable energy. As such, it addresses climate change - urgent action to combat climate change and its impacts – as a key sustainable development issue. It

* Corresponding author. Tel.: +31 152782783.
E-mail addresses: rfboehnke@gmail.com (R.F. Boehnke), T.Hoppe@tudelft.nl (T. Hoppe), J.C.Brezet@tudelft.nl (H. Brezet), K.Blok@tudelft.nl (K. Blok).

https://doi.org/10.1016/j.jclepro.2018.09.264
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is linked to the Paris agreement, which was adopted by countries across the World during the COP21 in December 2015. In the agreement, the countries agreed to work to limit global temperature rise, and to strive for 1.5 °C. Implementation of the Paris agreement is seen as essential to attain the SDGs. In order to meet the goals as stated countries across the world should transform their economies, and adopt cleaner production practices. This entails transformation of energy, industry, transport, food, agriculture and forestry systems (Nations, 2018b).

In line with the Paris agreement, which stresses the importance of subnational level climate change mitigation action implementation, the SDGs hold that action should be taken at city and community level, cf., 'by 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement holistic disaster risk management at all levels' (Nations, 2018a). Urban development will determine a nation's ability to deliver low-carbon services to citizens: current and future planning and construction decisions will lock in emissions, governing a city's ability to pursue a sustainable future (Corfee-Morlot et al., 2009). Correcting for overlap between local and national initiatives, it has been posited that members of three large city initiatives (Covenant of Mayors, C40, and ICLEI) have committed to a further emissions reduction of 1.08 $GtCO_2e$ by 2020 (UNEP, 2015) or even up to 15% of the total emissions gap (Erickson, 2014). It appears that the importance of cities as arena for climate change action seems to be recognized (Castan Broto, 2017).

Out of such initiatives, city actions have been reported to have the highest total committed emissions reduction (UNEP, 2015). There are key advantages for climate action to originate from local governments. First, local governments have the greatest contact with citizens, and it is on this local level where climate actions are taken (Ibid.): building renovations, changes in heating practices and power grids, and construction of renewable power plants all occur within municipal boundaries. These actions all have local spatial implications affecting citizens, businesses, and authorities as well as local regulation of transportation, construction, spatial planning, and the economy. Each aspect of implementation is crucial and must be considered to ensure initial and continued success of climate actions (Hoppe, van den Berg and Coenen, 2014). Furthermore, as hotspots for climate action, cities can innovate and pilot processes which could then be more broadly implemented if proven effective (Hoppe, Van der Vegt and Stegmaier, 2016; WWF, 2015).

Scholarly attention to climate action in cities genuinely focuses on large-scaled or even mega cities (Broto and Bulkeley, 2013; Bulkeley, 2013; Bulkeley, Castan Broto and Maassen, 2013). It stresses the role of megacities, capitalizing on their visibility and emphasizing their role as frontrunners in climate and sustainability (Ibid.). However, with only 12% of the urban population living in megacities, their publicity is overshadowing other urban centers, for instance those in polycentric regions. As 50% of the global urban population resides in cities with fewer than 500,000 inhabitants (DESA, 2015) it is important not to overlook them in the discussion of climate change (Hoppe et al., 2016). This necessitates further research as to understand the potential of these small- to medium-sized urban centers (SMCs).

While C40, a network of the world's megacities, has published a number of good practice guides for climate actions, they may require far greater capacities, political sway, and budgets than are available to smaller urban centers. The Covenant of Mayors (CoM; (Heyvaert, 2013) has also published several "Benchmark[s] of Excellence"; however, it is not a codification of good practice as it contains no guide to implementation nor budget required. In fact, it contains are merely a statement that an action has been taken without significant further explanation, which makes it hard to monitor whether climate actions have actually been undertaken. The latter might also be related to general difficulties regarding sustainable performance evaluation of cities, though.

The process of developing and implementing local sustainability performance and rating systems entails identification and communication of good practices, codification of suitable indicators, development of protocols (ideally tailored to city circumstances to meet actual needs), and the development and implementation of sound monitoring and evaluation systems. These systems support the analysis and evaluation of local sustainability performance, supports decision-making processes and help the communication between government, citizens and society. According to the principles of participation and subsidiarity, developing measurement tools stresses the needs to define suitable indicators in order to represent complex problems in a simple way (Scipioni et al., 2009). The latter are said to help to transfer the knowledge or know-how from one place to another, and should typically be derived from successful experiences (and good practices) and henceforth should be implemented elsewhere with the necessary modification to suit the local conditions'. This suggests a trade-off, with competing demands for standardization and replicability on the one hand and adaptation for context-sensitivity on the other (Dhakal and Imura, 2003). Making this trade-off can be challenging for cities and local governments. What is problematic in this sense is that indicators are mostly tailored for large-sized cities, but hardly fit smaller-sized cities in a satisfactory way (Bruni et al., 2017).

Examining climate action in SMCs to explore and codify good practices could provide valuable information for future actions, with the aim to increase the overall rate of global climate mitigation. Whereas analysis of climate action, plans and policy in scholarly work is often limited to studying formal policy documents (e.g., (Reckien, Flacke, Olazabal and Heidrich, 2015; Reckien et al., 2018), this study is more interested in practices and therefore also seeks to analyze perceptions on climate actions by SMC officials. The knowledge gap in this study addresses the meaning of good practices in local climate action by SMCs, its relation to actual lowering of GHG emissions, and the monitoring of this.

In this article the research question therefor are: "When exploring local climate mitigation action among multiple small- and medium-sized cities, what actions are perceived as good practices?", and (2) "Are there any demonstrable effects linking them to achieving climate mitigation targets, and is this monitored?" The locus of this study is SMCs in The Netherlands. The rationale for selecting these is because the country has a long tradition of local governments setting GHG emission reduction targets and higher governments making efforts to strengthen capacities of local governments concerning formulation and implementation of local climate mitigation policy, dating back to the 1990s (Hoppe et al., 2014; Menkveld et al., 2001).

In section 2 insights from relevant literature on climate mitigation actions, climate mitigation action plans, local climate mitigations governance, and good practices therein are presented. In section 3 the research design and methodology of the study presented in this paper are addressed. In section 4 the results of the analysis are presented followed by the academic discussion in section 5, and conclusions in section 6.

2. Local climate mitigation governance, action and action plans

This section presents insights from the literature on climate mitigation action, local climate mitigation action planning, good

practices in local climate mitigation action and performance evaluation of local climate mitigation action.

2.1. Climate action

There are many frameworks to classify climate actions. One of them, the Five Milestone framework (WWF, 2015), classifies five major climate action types: GHG inventory, quantifying reduction targets, action plan development, implementation, and monitoring. While these actions combine to form an essential part of an action plan, only one of them in this framework directly or indirectly leads to emissions reduction; this regards "plan implementation." City actions are defined as a broad range of programs and activities to help meet emissions targets; from energy plans to technical assistance (Broekhoff and Lee, 2015).

The definition that will be used in this paper, however, is one defined by the Carbon Climate Registry, "Actions include a diversity of measures that are planned, implemented and monitored, for example strategy, action plan or policy; regulation; technical or infrastructure; fiscal or financial mechanism; stakeholder engagement, etc. – addressing mitigation and/or adaptation (Deng-Beck and van Staden, 2015)." (this article will focus explicitly on climate mitigation actions). Further expanding upon this definition is the explicit understanding that climate actions are measures or initiatives cities take to mitigate the effects of climate change (e.g. to achieve GHG emissions reductions) (C40&ARUP, 2015).

Given the novel character many climate actions pertain (as novel responses to the complexity and sudden emergence of climate change) experimentation is required as an important way in which governance can drive the transitions to low carbon energy systems. In particular by creating space for innovative solutions to emerge learn how to govern them, which often comes with high expectations (Kivimaa et al., 2017). As such, it is not surprising that municipalities are increasingly engaging in various local energy experiments in order to act against climate change (Matschoss and Heiskanen, 2017). Experimentation is also claimed to be better suited to address the multidimensional and complex nature of climate change than more traditional modes of governance (Broto and Bulkeley, 2013). When perceived successful, good practices can be awarded and showcased in order to facilitate the transfer of innovative practices (Matschoss and Heiskanen, 2017).

2.2. Climate action plans

Reckien et al. (2018) define local climate plans as planning documents prepared at the city level that contain policies that are relevant to climate change adaptation and/or mitigation. A climate "action plan" or "climate program" as used in this article, is a document which codifies municipal climate mitigation actions which in total are projected to achieve GHG emissions reduction targets. The term will be reserved for the explicit definition of plans which codify actions to the standard of the definition seen in Table 1; however, since many municipalities title their documents as a "climate action plan" it is important to note that such documents do not, in general, achieve the standard of an "action plan". Additionally, while there is a great deal of information available in most typical individual municipal climate document, there is no standard format or method used when writing them. The classification is outlined in Table 1. A survey among 885 cities across 28 European countries revealed that approximately 66% have developed local climate mitigation action plans of their own. Cities and local governments engaging in local climate planning is related to city size, national legislation, and international networks (Reckien et al., 2018).

Developing a climate action plan is seen an important first step for local governments in mitigating GHG emissions. It requires establishing of an emission inventory, setting ambitious targets and adopting policy measures. Implementing action plans and the associated actions and policies require an effective system for tracking progress and producing transparent assessments. To establish a global overview this, in turn, requires a harmonized and open monitoring and reporting framework to increase the accountability of local governments in the Paris Agreement framework (Bertoldi et al., 2018). Monitoring and evaluating impacts is key to ensuring accountability as well as to enhancing learning and implementation effectiveness in local climate action (Lehtonen and Kern, 2009).

Approaches in local climate action planning are typically based on a traditional goal-attainment evaluation model. Assessments that pertain to this model have the operational purpose of contributing to the design and modification of interventions, as well as the accountability aspect of reporting on achievements (Damsø et al., 2017). Despite this focus on monitoring, evaluation and impact assessment the implementation of climate action plans is considered challenging to cities and local governments. A literature review performed by Damsø et al. (2017) found that studies that have been conducted, show that local governments meat great difficulties. Only seldom climate action plans are found to be implemented fully. Typically implementation is characterized by local governments merely grabbing the 'low-hanging fruit' while not addressing the more challenging long-range and complex aspects (Damsø et al., 2017).

2.3. Governing styles

Given the unique position and contact municipalities have with local citizens and business companies, they are ideally placed to tailor climate actions to their respective locations and avoid unnecessary lock in of GHG emissions (Corfee-Morlot et al., 2009; UNEP, 2011). However, there are several approaches available to local governments to meet their emissions targets. Furthermore, given that SMCs frequently claim to have few resources to implement climate action, choosing appropriate methods is critical (EEA, 2016). In their 2006 publication, Bulkeley and Kern (Bulkeley and Kern, 2006) outlined a set of governing styles employed by local governments to achieve climate mitigation targets: (1) Governing by authority (the municipality as regulator, enacting regulations to control other actors, strategic and urban planning, guidance); (2)

Table 1
Definitions of action plan, sustainability strategy, and climate roadmap.

Action Plan	Codified actions with GHG emissions reduction baseline and target, required budget, stakeholders, an implementation plan, and a monitoring scheme.
Sustainability or Climate Strategy	A clear definition of municipal strategy which falls short of the seven requirements of an action plan.
Roadmap	A climate document with themes and general breakdown of targets to achieve climate goals. This may include milestones, sectoral GHG emissions or energy consumption, and an outline of the overall strategy to achieve targets.

Self-governing (the municipality implementing climate actions themselves, limiting the ecological footprint of municipal stock); (3) Governing by provision (the municipality providing sustainable services – water, electricity, public housing, transport, etc.); and (4) Governing by enabling (the municipality as facilitator such as enacting subsidies, loan schemes, distributing information, coordinating climate actions among other actors, and establishing public-private partnerships). While all forms of action are likely to be employed, identifying trends and the use of specific governance styles to implement certain actions could be key to spreading effective climate actions.

Several studies were conducted to identify the prevailing mode(s) of governing used to enact climate actions; however, a consensus has yet to be reached. In their 2006 paper, Kern and Bulkeley suggested that enabling was developing as the core method used to enact successful climate policy, noting that this represented a key shift in local governance and could pose difficulties as a result. (Bulkeley and Kern, 2006) outlined a set of governing styles employed by local governments to achieve climate mitigation targets. A further study by Giest found that self-governing and enabling were the most prevalent in climate actions in Europe, indicating that through these governance styles local governments were afforded great discretion and decision making power (Giest, 2013). In a study of 627 climate experiments in 100 global cities, Castan Broto and Bulkeley found enabling to be second to provision in prevalence (Broto and Bulkeley, 2013). However, a study of four Dutch SMCs in 2016 found that self-governing and authority were most used by local governments, stating that enabling was hardly used as a governing strategy to enact climate actions, and was seen by local stakeholders as merely ornamentation as opposed to a real strategy to achieve climate targets (Hoppe et al., 2016).

Direct local action is required to decrease the emissions gap, and the appropriate local approach to climate action is critical to achieving the maximum city mitigation potential (Corfee-Morlot et al., 2009; EEA, 2016). Local governments can, however, be supported by national governments, especially in relation to building capacities to formulate and implement climate mitigation policies of their own. For instance, in the Netherlands, via the 'BANS' scheme (Governance Agreement New Style; translation by the authors) which encouraged local governments to develop climate policies of their own; and later the 'SLOK' scheme, a program dedicated to perpetuating the implementation of climate initiatives (Hoppe et al., 2014); and 'LKA' (Local Climate Action), a program through which was claimed to have directly and indirectly resulted in over 10,000 actions being taken in The Netherlands (kplusv, 2015). Such programs can encourage capacity building as well as increase collaboration and the dissemination of critical information to local policy makers (Hoppe et al., 2014).

Despite the existence of national programs focusing on local climate action, there remains a lack of knowledge on 'good' (or even 'best') practices regarding actions that can be undertaken by local governments. As such, further exploration is necessary to build a consensus on the appropriate governance styles for specific climate actions, or, alternatively, the codification of good practices or strategies to implement similar climate actions using diverse governance methods. However, without coordination between local climate actors, it is unlikely that local governments will deliver on their potential to close the emissions gap (Climategroundswell, 2017). Currently, sub-national action to address climate change often occurs in uncoordinated and haphazard fashion. There are large disparities within and between continental regions, and in terms of target-setting, implementation and monitoring (Bansard et al., 2017).

2.4. Good practice in climate action

Defining good or best practice for climate actions is difficult because, though there are many cities which claim to be climate leaders with examples of successful actions (Broto and Bulkeley, 2013), the local contextual differences among cities prevent the codification of action architypes (Olazabal et al., 2014). Furthermore, implemented climate actions may be selected based on their ease and timeframe of implementation rather than their ability to produce effective mitigation results as long-term goals and proposals are not yet fully integrated into urban development plans (Corfee-Morlot et al., 2009). While action planning is seen as a key aspect of local climate action (C40&ARUP, 2015), policymakers often have to redirect their focus towards the implementation of specific programs as opposed to on creating city-level plans as there hardly any relation between drafting a climate plan and achieving emissions reductions (Millard-Ball, 2012).

City networks have an important role in showcasing good practices, especially at international events, often moving local politicians to make public commitments to climate change action. For example, the UNFCCC secretariat organizes a forum on best practices in cities and subnational authorities, highlighting the importance of cooperation, voluntary action and participatory, people-oriented approaches (Castan Broto, 2017). A survey among city governments revealed that network membership does make a significant difference in the number of different measures that are adopted. For this reason, in the absence of concrete international commitments, city networks can arguably be seen as facilitating forms of global governance that enable city government to adopt climate policies independently and proactively (Rashidi and Patt, 2018).

Although local climate policy, action and practices is a growing field, scholarly attention is generally skewed towards large/mega cities in Western countries (Hoppe et al., 2016). Criticized for their small size, uncertain power over decision making (Corfee-Morlot et al., 2009) and limited capacity, SMCs are commonly overlooked when considering good practices for climate actions. However, even if such policies be enacted, there is a possibility of emissions generating activities hopping from the regulated to a nearby, unregulated locale, diminishing the measurable effect of such a practice (Krause, 2011a; b). While there may be little literature available on good practices for SMCs, C40 has published eleven guides for good practices demonstrated in their cities (C40Cities, 2017). Each document is specific to a particular area in which cities will implement climate actions. However, despite their existence, in only two of the eleven is there any standard mentioned by which a "good practice" was assessed; both were for transport practices and provided rating systems, however, they did not list the scores required to be considered "good practices". As a result, it appears that "good practice" was assigned to actions which were taken and achieved some emissions reduction.

2.5. Challenges in monitoring of good practices and climate performance of cities

In order to demonstrate good practice some form of monitoring must be regularly completed to show the effects of the implementation of projects and action plans. However, such regular project- or city-level data is seldom available, even from major cities hailed to be at the forefront of climate action (Brooks, 2017). This has to do with difficulties generally related to the measurement and evaluation of sustainable performance of cities, and the fact that while urban sustainability performance is measured across the world, there is no single set of indicators that can be used for all urban areas or cities (Shen et al., 2018).

First, defining effective sustainability indicators is a complex objective due to the complexity of the phenomena concerned and the difficulty to integrate indicators into a single measure. Indexes describing local sustainability complexity are found to be difficult to synthesize (Scipioni et al., 2009). Moreover, due complexity and conceptual novelty common scientifically salient definitions might still be absent, and a plethora of definitions might be used that differ greatly from each other (Bruni et al., 2017). Second, different stakeholders might have different understandings of the meaning of the indicators, and attach different relevance to them or the themes indicators belong to (Mazzi et al., 2012). In addition, selection, interpretation and use of indicators often meets great difficulty (Verma and Raghubanshi, 2018). Given these problems, it is not surprising that there is a lack comparable indicators municipalities adopt (Mazzi et al., 2012). This also has to do with the fact that administrations are involved in the management of different sets of issues, including many that are not even under their direct responsibility (Ibid.). Many indicator sets of local sustainability emphasize the use of outcome indicators, in particular GHG emissions. Although this as an indicator is valuable in giving a sense of direction and acting as a political signpost, it is only partially linked to local action and to the activities undertaken (Lehtonen and Kern, 2009). Despite this obvious shortcoming there are but few indicator sets and measurement that also address indicators linked to concrete local action (i.e. indicators addressing process, throughput or output) (Niemann et al., 2017). A study by Damsø et al. (2017) shows the need for use of activity-related evaluation metrics, scope consistency, and targets that can provide a robust incentive through energy systems that are bound to change in the future. Third, there are problems with data availability or measurement without interruption. Knowledge or information sharing might be limited (Scipioni et al., 2008), for instance following unwillingness on part of the government to implement the indicators (Verma and Raghubanshi, 2018). Moreover, there might be a lack of consensus on what constitutes standard indicators. Lack of comparative analysis across disciplines and cities also inhibits proper implementation of indicators and measurement systems (Ibid.). Finally, given the experimental nature of many climate actions and projects there is a need to address indicators for critical evaluations of experiments (e.g. also addressing issues like learning, and coping with multiple types of regime barriers) (Kivimaa et al., 2017).

When looking into the use of indicator systems pressing difficulties include local government officials experiencing 'reporting fatigue,' leading to the discontinuation or radical altering of sustainability reporting practices, or difficulties maintaining public interest over time (Niemann and Hoppe, 2018). Whereas many indicator sets have been developed with the aim of providing policy directions, their sheer numbers and complexity make them unattractive for practical use by public officials and policy makers (Pissourios, 2013). Communication to target audiences has also proven difficult at times. Pires and Fidels (Pires and Fidélis, 2015) found that indicators mainly targeting local council departments, but lacked external visibility and strategies to reach the general public. This led the indicators to become ineffective in raising public awareness about sustainability to inspire behavioural changes, encouraging collective action and value shifts, or to generate new debates, discussion forums or participative mechanisms to embrace the challenges of local sustainability. Neither was participation of external actors in the indicator design process sufficient. In fact, participation was reduced to internal procedures for experts and public officers. (Ibid.). Finally, indicator set users and annalists run the risk that sustainability indicators become a goal in itself, instead of their initial purpose to serve as a means to an end (Shen et al., 2018).

Lack of common indicator set and quantitative data are considered major barriers to analyze strategies, and could explain the prevalence of case-study research used to analyze urban climate action (Millard-Ball, 2012). Moreover, currently there is a lack of systematic knowledge on the global contributions of cities to the Paris Agreement. This reinforces the need for a global, comprehensive and transparent framework for cities and local governments (Bertoldi et al., 2018). This problem can also be illustrated by a policy evaluation of over 10,000 energy and climate actions undertaken by the 'Lokale Klimaatagenda' (LKA; an intergovernmental policy support scheme on local climate policy in the Netherlands) which revealed that it could only be stated 'qualitatively' that they had an assumed 'positive effect' on lowering of GHG emissions (kplusv, 2015). While it does appear that the capacity for climate actions has increased in recent years, there is little evidence that this went along with an increase in goal attainment; i.e. lowering of actual carbon emissions (Hoppe et al., 2016).

Given the lack of available quantitative outcome data (e.g. GHG emissions), other indicators are increasingly used, such as the existence of action plans, network memberships, and the total number of actions taken to show progress (Kern and Bulkeley, 2009; Reckien et al., 2015). However, while action planning has been used as such an indicator there is little robust evidence that such plans lead to its implementation or to the success of those climate actions described (Millard-Ball, 2012; Reckien et al., 2015). Furthermore, it was found that the weakest points in climate documents are actionable components. Moreover, the documents on the whole are rendered inadequate to achieve their emissions targets (Krause, 2011a; b). Such deficiencies in both data collection and action planning have led to an inadequate pursuit of good practices.

3. Research design and methodology

3.1. Research design

The research design concerns an explorative multiple case study approach entailing thirteen SMCs in the Netherlands (albeit not in a comparative 'cross-case'- analytical sense). This is used because case studies allow an empirical inquiry into a current phenomenon within its real-life context. Selecting multiple case studies instead of a single case one was done to generate a complete image of the phenomenon under research in a subset of (rather homogeneous) cases (i.e. SMCs). Under the assumption that the set of cases are selected in valid way, the latter has the benefit over the former that there is better possibility for generalization of conclusive statements. For this study it is used to address such problems as multiple sources of evidence are critical to gain any reasonable understanding of the situation, and, given the nature of climate actions and policy, there are a dearth of variables available to be analyzed, far more than the number of actions taken by municipalities (Yin, 2003).

3.1.1. Case selection

SMCs in the Netherlands were selected because most municipalities in the country run their own local climate policy, and the country has a vast history with programs on local climate policy (i.e. (Hoppe et al., 2014). Thirteen cities were selected, using a purposeful sampling approach of similar cases (Gerring, 2007), but with a reasonable geographic spread across the country. Sampling was based on population size, between 50,000–250,000 inhabitants, to study what meaningful climate actions could be taken by the local governments in a variation of SMCs. Specific cities were targeted to achieve a range of populations, municipal sizes, geographical variation, and achieved five-year CO_{2e} emission

reductions. The cases selected were: Almere; Amstelveen; Arnhem; Den Bosch; Eindhoven; Goerree-Overflakkee; Groningen; Haarlemmermeer; Helmond; Leeuwarden; Maastricht; Nijmegen; Zaanstad. Most are medium-sized cities that have a predominant urban profile. While the number of cases studied in depth is too small for statistical generalization, we believe the set of cases selected would suffice to lay the groundwork for understanding what municipalities perceive as good climate actions, how and where municipalities implement climate actions, and aims to illuminate and analyze related patterns.

3.2. Research phases

The multiple case study research approach allows for using both qualitative and quantitative research data and methods. As such, the research design applies a mixed methods research design (Johnson and Onwuegbuzie, 2004). On each case study data were collected based on quantitative and qualitative data gathered from a variety of sources, including but not limited to the *Klimaatmonitor* (Rijkswaterstaat, 2018), municipal climate documents, CBS data (Statistics Netherlands; (Statline, 2018), and interviews with civil servants from each of the municipalities studied. The research conducted involved five phases. Phases 1 and 2 address answering the first research question ("When exploring local climate mitigation action among multiple small- and medium-sized cities, what actions are perceived as good practices?"). Phases 3, 4 and 5 address answering of the second research question ("Are there any demonstrable effects linking them to achieving climate mitigation targets, and is this monitored?"). The five research phases are presented in Table 2 and will be addressed in more detail below, paying attention to approach, data collection, use, and analysis.

3.2.1. Phase 1: mapping good practices

Each of the selected municipalities was studied in-depth to the extent time allowed to give context to and clearly describe relevant phenomena to local climate actions taken within those municipalities based not only on concrete emissions indicators but also on anecdotal evidence from climate actors working within each location. Qualitative data concerned both written documents and interview data. Data used for this study were collected on a series of key indicators used to assess the state of climate action in each of the surveyed municipalities: i.e. on goals, local initiatives and projects, the municipal role, and climate network membership.

For each municipality, an expert interview was conducted with one or more civil servants. Next to interviews with civil servants of municipalities interviews were conducted with experts on local climate action from other organizations. The total number of interviews was 46. Interviews were conducted between November 2016 and May 2017, and lasted for between 1.5 and 2.5 hours each. All interviews were conducted in person (by the main researcher; the first author of this article) to ensure that the greatest accuracy possible, and all interviewees were told explicitly that these data would be made public upon the publication of this study.

No pre-fixed (semi-structured) questionnaires were used. Interview structure was open and fluid to allow each civil servant the time to focus on whichever topics and climate actions which were of critical interest to their work, but especially addressed good practices in climate change mitigation as perceived by the interviewee. This allowed the interviewees to reveal how they think about local climate actions and practices, and to expand on and clarify the narratives and views they have. Moreover, this enabled thoughts and interests of interviewees to be explored in depth (Doody and Noonan, 2013; Holloway and Galvin, 2016). Although no questionnaire was used in a strict sense, the following general themes were addressed in the interviews: (i) introduction and explanation of the study; (ii) examination of quantitative data collected of the municipality and discussion of climate documents; (iii) discussion of the municipal role in climate action; (iv) discussion of municipal good practices to implement climate action; and (v) barriers to climate action.

After the interviews, notes taken during the interviews were rewritten incorporating elements from municipal climate documents and quantitative data where relevant, and sent to the interviewee to be checked for accuracy. This allowed structured qualitative analysis of data pertaining good practices. Good practices were identified and inductively categorized into classes of good practices. Through repeated cycles of text interpretation meaning was given to those classes of good practices, using a 'grounded' approach (Glaser and Strauss, 2017).

3.2.2. Phase 2: governance analysis

Expert interview reports and policy documents were analyzed to establish knowledge on governing styles used. To analyze the qualitative data, a table of climate governance indicators was developed. Next, these data were reflected upon critically through repeated cycles of interpretation while using the table with

Table 2
Research phases of this study.

Phase	Type of analysis	Data used	Qualitative or quantitative?
Phase 1: Mapping good practices	- Qualitative analysis - Text analysis	- Expert interview transcripts - Policy documents	Qualitative
Phase 2: Governance analysis	- Coding of climate actions and good practices into governance categories - Comparison between modes of local climate governance (raw frequencies)	- Expert interview transcripts - Action plans/policy documents	Qualitative Quantitative, i.e. Quantification of qualitative data
Phase 3: Analysis of action plans	- Coding of action plans content - Comparison between key elements of action plans (raw frequencies)	-Local action plans	Quantitative; Quantification of qualitative data
Phase 4: Analysis of key characteristics of municipalities vis-à-vis climate action.	- Coding of qualitative data content - Comparison between key elements of action plans (raw frequencies)	- Policy documents - Expert interviews	Quantitative; Quantification of qualitative data
Phase 5: Impact analysis	- Calculation of GHG emissions per municipality. - Trend analysis, comparing municipal performance against average performance of municipalities in The Netherlands	- klimaatmonitor GHG emission data per municipality - CBS Statline - Sustainability Index	Quantitative

indicators. Once organized, general trends were established and each policy, climate action and program organized were assigned codes related to the type of governing style as mentioned in Bulkeley and Kern's (2006) article. Next, these data were quantized in order to allow for analysis of raw frequencies of local climate governing style occurrence.

3.2.3. Phase 3: analysis of action plans

Policy documents, particularly action plans, were analyzed to identify climate actions. They were analyzed in a similar fashion as the text documents for the governance analysis. Inductively, key characteristics of climate action plans were established. Climate actions were then quantitized, which allowed for establishing raw frequencies for occurrence of each of the action plan characteristics, like e.g., stakeholder involvement, presence an implementation plan, and presence of a monitoring scheme.

3.2.4. Phase 4: analysis of key characteristics of municipalities vis-à-vis climate action

Similar to the approach in phase 3, relevant characteristics of municipalities vis-à-vis climate change mitigation governance were analyzed. Data used for this analysis mostly concerned expert interview reports. After key characteristics were established for municipalities, they were coded into inductively generated characteristic items (like membership of Covenant of Mayors, or presence of citizen-led energy cooperatives). This allowed for establishing raw frequencies for occurrence of each of the action plan characteristics, and comparing these frequencies between the key characteristics classes that were established.

3.2.5. Phase 5: impact analysis

Quantitative data were gathered from a variety of sources, each which adhere to a standardized collection methodology and record data from most Dutch municipalities. The main sources of information were *Klimaatmonitor* (Rijkswaterstaat, 2018), *Openspending.nl* (Foundation, 2018), *StatLine.cbs.nl* (Statline, 2018), Sustainability Index (COS, 2009), municipal climate documents, and municipal civil servants. *Klimaatmonitor* was used to collect municipal data on GHG emissions per municipality. *Openspending.nl*, is an online platform presenting information on financial accounting of municipalities. *CBS Statline* was used to collect key socio-demographic data per municipality. The *Sustainability Index* is a rating tool presenting performance of municipalities on a wide set of sustainability indicators (categorized according to the 'Triple Bottom Line' heuristic; see also (Niemann et al., 2017).

In order to support the claim that a climate action is a good practice, ideally any quantitative data available to show this at both the project and municipal levels would be used. While project-level data was unavailable for this study, the *Klimaatmonitor* dataset (Rijkswaterstaat, 2018) holds sectoral data from nearly all Dutch municipalities which were used extensively in this study. Table 3 presents quantitative indicators on local climate performance for Dutch municipalities in the *Klimaatmonitor*. These concern foremost outcome indicators, and to a lesser extent input, output indicators, and a few contextual background information items.

Data collected were then organized into a table of key metrics from municipalities. In addition, multiple databases were created containing emissions, energy intensity, and renewable energy data from Dutch municipalities to further explore the possibility that the results of this study could potentially be generalized to other Dutch municipalities. Based on this table of indicators, exploratory statistical analysis was conducted on the municipalities which participated in this study, and then across all Dutch municipalities. The resultant data could then be directly compared to one another, plotting two indicators individually to explore and illuminate trends could be identified either within a single municipality, or across the entire range of municipal-level data available. For each case, plots of the annual emissions, energy intensity, and renewable energy production were made for the period of 2010–2015. From these charts, overall trends were analyzed over the time period and coupled with the absolute values observed.

Table 3
Key quantitative indicators for local climate performance in the Klimaatmonitor.

Population
Change in Population
Area [km2]
Population Density
Per Capita Emissions 2015
5 year Absolute Change [Tons]
5 year %per Capita Change
Per Capita Energy Intensity 2015
5 year Absolute Change [TJ]
5 year %per Capita Change
Per Capita Renewable Energy 2015
Total Renewable Energy [TJ]
% Renewable Energy
Registered PV [kWp]
Registered Wind [MW]
% LED Public Lighting
FTE
Climate Budget [€]
Climate Budget per Capita [€/person]
Total Environmental Budget [€]
Total Municipal Budget [€]

4. Results

4.1. Phase 1: mapping good practices

The compiled good practices can be divided into five broad categories in order to further analyze how Dutch civil servants were approaching climate actions and to draw broader lessons from the interviews (see Table 4). The overwhelming majority, 23 out of 26 good practices, exhibited the characteristics of 'governing by enabling'. Practices could be classified into (i) public engagement; (ii) citizen-led energy cooperatives; (iii) municipal actor engagement; (iv) company consortia; and (v) project creation (detailed descriptions of each of those five good practice collections can be found in Appendix 1). Concerning the role of local government in climate change mitigation the civil servants interviewed unanimously agreed that the role of the municipality was that of a facilitator, assisting other parties to implement climate actions and, collectively, achieving local climate targets. Put in other words: governing by enabling local stakeholders.

4.2. Phase 2: governance analysis

140 out of the 307 climate actions were categorized in municipal documents, and 21 out of 26 good practices can be classified under "governing by enabling". This may suggest that enabling is linked to more successful project implementation.

Interviews with civil servants revealed that 'governing by enabling' was by far the dominant mode of governance, with other modes (governing by authority, self-governing, and provision) hardly mentioned (See Fig. 1). Whereas assessment of documented local climate actions also revealed governing by enabling as the most dominant governing mode, other forms of governing were found more commonly (See Fig. 2). The big difference between the preferences revealed by the civil servants and documented climate actions is that civil servants apparently believe that only enabling

Table 4
Collection of good practices discussed in interviews with civil servants (name of municipality in parenthesis).

Public Engagement	Energy Ambassadors (Almere)
	Energy Scans (Almere)
	Subsidy Schemes (Almere)
	Public Engagement (Arnhem)
	Wind Turbines: External Pressure (Goeree-Overflakkee)
	Energy Cafés: Public engagement (Zaanstad)
Citizen-Led Energy Cooperatives	Energy Cooperatives (Eindhoven)
	Energy Cooperatives (Groningen)
	Lisserbroek: Energy Cooperation (Haarlemmermeer)
Municipal Actor Engagement	How to engage Municipal Actors (Almere)
	Municipality: interdepartmental engagement (Goeree-Overflakkee)
	Engaging Municipal Actors: Redefining Role (Nijmegen)
Company Consortia	Creating a consortium of companies (Arnhem)
	Bosch Energy Covenant: Organization of Companies (Den Bosch)
	Heating without gas (Eindhoven)
	Company energy coalition (Groningen)
	Helmondse Energy Community (Helmond)
	Business involvement: Project teams (Leeuwarden)
	Platform COOL (Maastricht)
	Nijmegen Energy Covenant (Nijmegen)
	Company Energy Consortium (Zaanstad)
Project Creation	Sustainable Transport (Amstelveen)
	EnergyNul73 Homes: Zero Energy Homes (Den Bosch)
	MeerMaker: Municipal Company (Haarlemmermeer)
	Housing Organization (Leeuwarden)
	Large Wind Turbines: Engaging the public (Nijmegen)

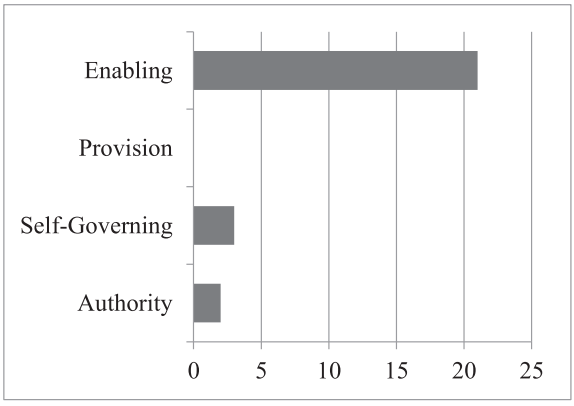

Fig. 1. Modes of governing identified in 26 good practice actions.

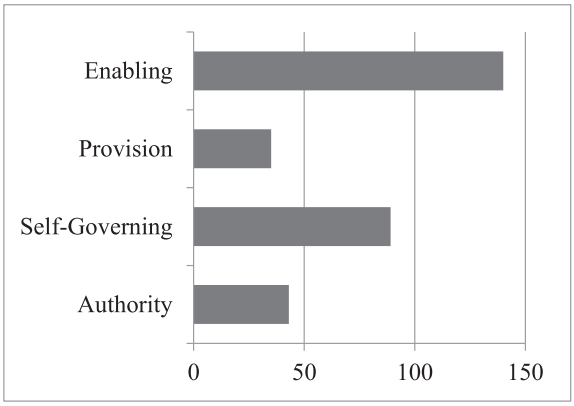

Fig. 2. Modes of governing found in 307 local climate actions.

actions work in the end. Disregarding other governing modes can be illustrated by the example of governing by authority. One action based on this governing mode was very commonly discussed by the interviewees, and addressed the enforcement of the Environmental Protection Act, mandating energy efficiency renovations for medium-sized energy consumers which have a less than five-year payback time, hence lowering carbon dioxide emissions. While the legislation was ratified in 1993, interviewees conveyed that it was seldom enforced. A common message from interviewees was, “We don't have the power to act.” In fact, in the Eindhoven case, only after a group of companies approached the municipality requesting that the legislation be enforced, did the municipality act.

4.3. Phase 3: elements required for action plans

Every municipality surveyed had published climate documents and civil servants dedicated to their planning and implementation. However, the quality of the planning did highly vary, and, within this study, no true ‘Action Plan’ was actually found, in the sense that we argue that an action plan requires: an emissions reduction targets, GHG baseline, defined actions, required budget, stakeholders, implementation plan, and monitoring scheme. This signals the problem that although ambitions plans are formulated, few of these plans are actually implemented, a phenomenon also found recently in a national ‘scan’ among Dutch municipalities (Hendriksma, 2017). Moreover, a conspicuous absence was that of clear monitoring schemes for municipal actions. Although project reviews were found which evaluated progress of past climate schemes, we were unable to find methodologies or other information on how this was actually conducted in a systematic fashion. Interviews with civil servants revealed that local climate actions were hardly monitored. Whereas most of the municipalities surveyed, initially expressed the intention to monitor local low carbon projects, the time and effort quickly grew beyond the available resources. Consortia of local stakeholders were neither found to monitor progress, although a few local citizen energy cooperatives were. When asking about awareness and use of *Klimaatmonitor* data for local policy purposes, civil servants indicated to be hardly aware. In sum, the available data (on local climate mitigation performance) were not used. Furthermore, none of the municipalities surveyed entailed a written strategy to achieve their long-term climate mitigation goals.

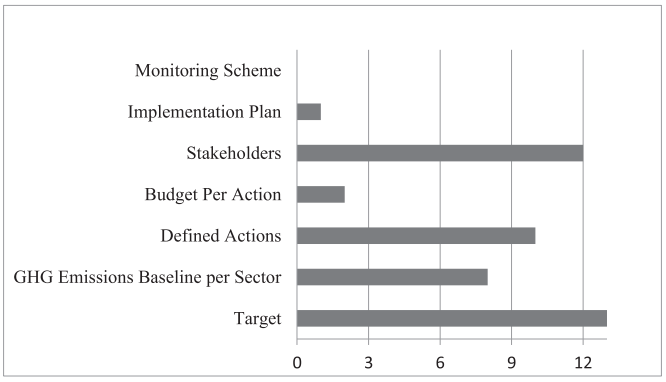

Fig. 3. Elements required for action plans as found in 13 performed case studies.

Overall, documentation on climate and sustainability from a municipal level was omnipresent in this study. No municipality lacked at least some level of climate roadmap and all had access to data which can both be used to benchmark their own efforts as well as compare progress to other municipalities (see Fig. 3).

4.4. Phase 4: analysis of key characteristics of municipalities vis-à-vis climate action

Several qualitative indicators were gathered during interviews and reviewing climate in addition to aspects of municipal action plans. As can be seen in Fig. 4, while climate strategies are prevalent in Dutch municipalities, there is a conspicuous lack of action plans as well as any sort of robust long-term planning for climate actions. In spite of this, energy cooperatives, company consortia, and membership to the *Klimaatverbond* were common within the sample. However, non of the investigated municipalities reported involvement in the Local Climate Action program ('LKA'). This is striking since this intergovernmental support scheme was designed to support municipalities to engage in climate action and build capacities.

4.5. Phase 5: assessing impact of good practices

The first step to assessing good practice using quantitative indicators available to this study, was to show conclusively that progress, namely emissions reductions, have occurred. To assess this, the municipal emissions per capita were calculated for selected illustrative municipalities. As can be seen in Figs. 5 and 7,

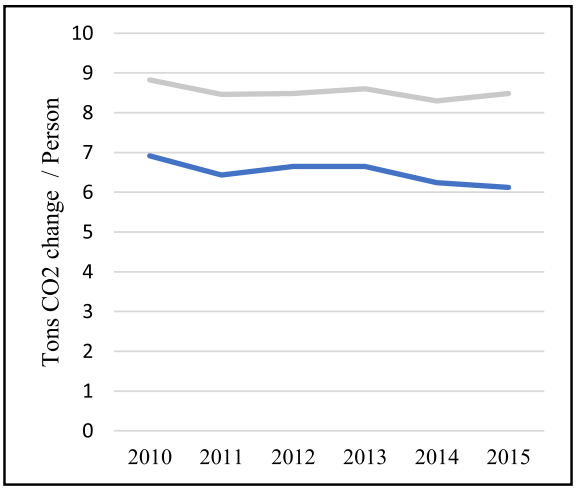

Fig. 5. Trends of total emissions per capita for the city Nijmegen (Tons/persons) compared to the average for all Dutch municipalities, over 2010–2015 (Nijmegen: dark blue line; average The Netherlands: grey line). (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

the municipalities of Den Bosch and Nijmegen have a small decrease in emissions over the 2010–2015. One immediate observation is the reduction between the years 2010 and 2011 in both municipalities (and nearly every municipality in the Netherlands) and the subsequent increase in emissions in 2012 with respect to 2011. Given these near ubiquitous jumps, it is likely related to a common factor on a national scale due or to an environmental event or other source which affected all Dutch municipalities.

Coupled with the annual total per capita emissions for each municipality is the percent change per year (Figs. 6 and 8). When examining these figures, it is apparent that while a reduction in emissions occurs in each of these two municipalities, those annual reductions are not consistent over the time frame, fluctuating each year. However, what remains consistent both in the total emissions and percent per capita change is municipal emissions mirroring national trends. It is possible that the way emissions are calculated using the national electricity mix may play a role in this phenomenon. This can be seen in the emissions factors used by the *Klimaatmonitor* (See Table 5) which are used to calculate the Scope 2 emissions resulting from energy consumption at the point of use.

While the emissions factor for heat remained constant over 2010–2015, that for electricity fluctuated reflecting the national electricity mix (See Table 5). From 2010 to 2011, there is a decrease

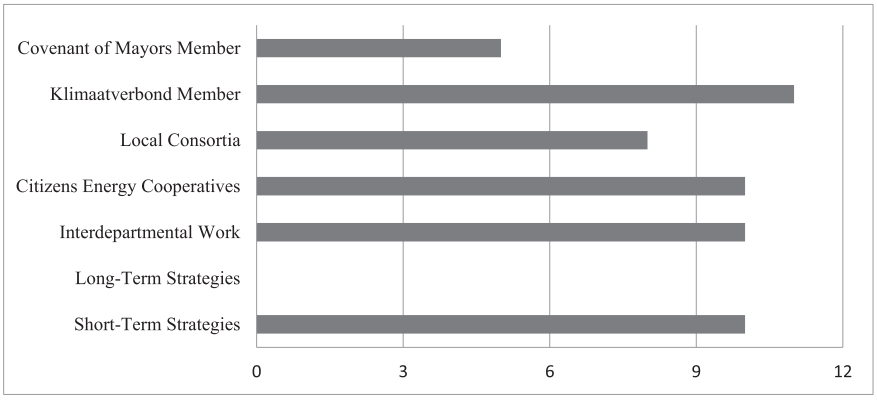

Fig. 4. Selected qualitative indicators from Dutch municipalities.

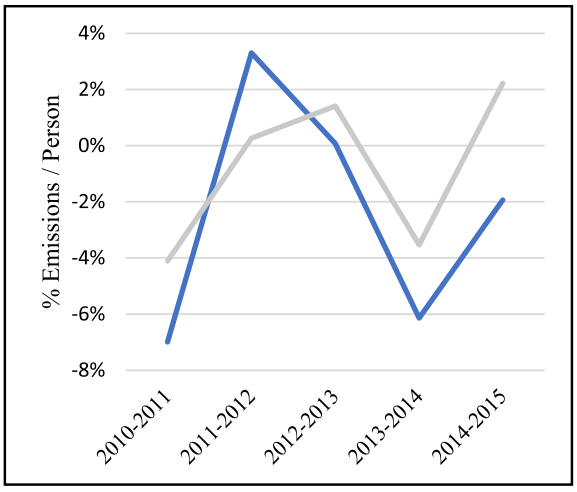

Fig. 6. Trends of total emissions percentage per capita for the city Nijmegen (Tons/persons) compared to the average for all Dutch municipalities, over 2010–2015 (Nijmegen: dark blue line; average The Netherlands: grey line). (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

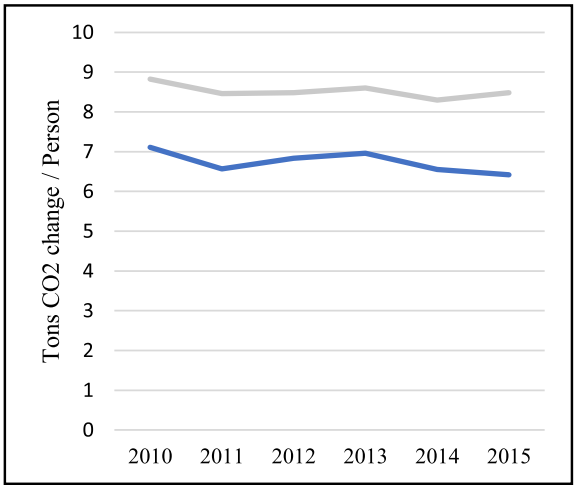

Fig. 7. Trends of total emissions per capita for the city Den Bosch (Tons/persons) compared to the average for all Dutch municipalities, over 2010–2015 (Den Bosch: dark blue line; average The Netherlands: grey line). (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

in the emissions per kWh, which then increases to slightly greater than its former level. However, the emissions factor increased between 2013-2014 and 2014–2015, suggesting that other factors may also play a significant role in the decrease in emissions between 2013 and 2014 and the overall increase seen between 2014 and 2015.

What is critical is that the rate of change per year shifts dramatically in comparison to the emissions reduction, even though it appears that the per-capita emissions remain relatively stable though decreasing over the entire period. As can be seen in Figs. 5 and 7 the standard deviation from the mean of per capita emissions reduction is between 3 and 4% for these municipalities, and averages nearly 4.5% over the entire Netherlands. This suggests that while emissions reductions are occurring, the rate which can be calculated potentially has an error of ±4%. With overall reductions of 12% in Den Bosch and 10% in Nijmegen, it is difficult to

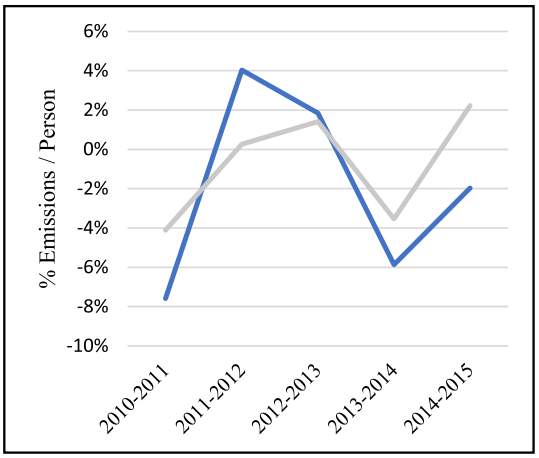

Fig. 8. Trends of total emissions percentage per capita for the city Den Bosch (Tons/persons) compared to the average for all Dutch municipalities, over 2010–2015 (Den Bosch: dark blue line; average The Netherlands: grey line). (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

Table 5
Annual emissions factors for electricity and heat production within The Netherlands.

	Electricity [kg/kWh]	Heat [kg/GJ]
2010	0.46	35.8
2011	0.44	35.8
2012	0.47	35.8
2013	0.48	35.8
2014	0.50	35.8
2015	0.53	35.8

claim what the results of a local climate strategy as due to its implementation given such wide fluctuations *and* the mirroring of national statistics as discussed above. Moreover, without detailed information on GHG emission reduction realized at local projects it is hard, not to say impossible to make any claims about the influence local climate strategies and plans have on total local GHG emissions and reductions of these.

5. Discussion

Governing by enabling was found to be the predominant method used to implement climate actions, accounting for 80% of the good practices discussed and 46% of the total climate actions surveyed. Self-governing actions were second in prominence used for 12% of the good practices and 29% of the total actions. This result builds upon the assertion from Betsill and Bulkeley's article (Betsill and Bulkeley, 2006) that governing by enabling is on the rise, and contradicts somewhat the findings from the study by Hoppe et al. (2016) which found in that governing by enabling was only used to a limited extent (in the latter, however, the views of non-governmental actors were also included).

Large-sized cities are said to be better equipped to combat climate change than their smaller counterparts (Hoppe and Coenen, 2011). They have more capacities and more resources at their disposal, which puts them in a better (organisational) position to adopt sustainable policies, and actively engage in international issue networks (Kern and Schophaus, 2004). They use this to adopt progressive policies, and experiment with novel – often technical – low carbon experiments, often in partnerships with private sector partners (Broto and Bulkeley, 2013). SMCs on the other hand, are found to have more engaged citizen action, as smaller towns do not

suffer from high agglomeration problems, and generally have higher social cohesion. Moreover, SMCs are often well connected to inter-municipal regional networks (Hoppe et al., 2016), while large-sized cities are more active in international issue networks. The results of our study mirror some, but not all of these statements. First, the SMCs studies were found to mainly use a 'governance by enabling' governing style (vis-à-vis both good practices and documented climate actions), which is little surprising given the obvious lack of capacity and applicable resources SMCs have. However, they did actively engage with local (semi-) private sector stakeholders, and in majority worked with them consortia or partnerships. Only few of them actively engaged in international networks (i.e. CoM); most networking was national via the *Klimaatakkoord* (Climate agreement; translation by the authors), although little actual inter-municipal networking occurred according to the civil servants surveyed. Second, the absence SMCs have on information on long term strategy, implementation, and evaluation in local climate action planning is in line with the claims in the literature.

An interesting good practice discussed concerned community energy initiatives, and their ability to act independently and attain low carbon goals. Such cooperatives could take climate actions directly, independently of the local government. Arguably, these civil initiatives can act on their own to a certain extent even without much 'governing by enabling' from the municipality; arguably on "arm's length of government", which is in line with results from several studies on local energy cooperatives and their vis-à-vis local government (Oteman et al., 2014) (Hufen and Koppenjan, 2015; Oteman et al., 2017) (Hoppe et al., 2015; Warbroek and Hoppe, 2017).

Another observation was local climate policies having relatively high ambitions and defined actions, but hardly any implementation plans nor monitoring schemes in place. This observation is in line with other studies revealing the gap between ambitions on the one hand and implementation and monitoring in local climate actions on the other (i.e., (Hoppe et al., 2011) (Bedsworth and Hanak, 2013; Krause, 2011a; b) (Hoppe et al., 2016). We argue that action plans are essential to support this, as poor implementation often roots in poor preparation and planning. Furthermore, in line with observations made in other studies, i.e. (Pires and Fidélis, 2015) external monitoring and collaboration on this part were found to be rather poor. However, it remains to be studied whether or not action plans would lead to emissions reductions, and whether weak implementation is a result of weak planning.

We also feel the need to respond to those who argue that cities have three roles in sustainable transitions: first, as primary actors; second, as a seedbed for testing and experimentation; and third, by being aware that the city government's role is actually rather limited in comparison to that of other actors (Geels, 2010). In the role of a primary actor, in Dutch cities, civil servants were primarily concerned with the local building stock and other domains within the municipality over which they had control. However, this role as primary actor was not what civil servants were striving for. Enabling as a strategy and in how actions are approached dominated Dutch local climate policy. It remains to be shown whether or not this strategy will lead to significant emissions reductions, and, ultimately, to achieving their long-term climate targets. The study showed there was ample room for experimentation with novel climate action and 'good practices', revealing many social and policy novelties. As such there might be a need to monitor and (critically) evaluate these policy experiments, and hence create specific indicator sets to support this (Kivimaa et al., 2017).

Although cooperation and support between municipalities and higher levels of government is considered essential in the local climate action literature (Lafferty and Coenen, 2001) (Sharp et al., 2011); (Späth, 2013); (Hoppe et al., 2014) hardly any evidence in support of this claim was found in our study. Strikingly, use of the intergovernmental support scheme on Local Climate Action ('LKA') was not mentioned by our interviewees at all (albeit the official policy evaluation claims direct and indirect influence to over 10,000 local climate actions (kplusv, 2015). As has to be stated, though, the current intergovernmental support scheme only embodied a 'networking scheme' with relatively little budget when compared to its predecessors which entailed actual financial support for capacity building to municipalities (Hoppe et al., 2014).

Further broadening this discussion is whether local energy transition requires top-down governance, national to local, or situative governance, focusing on empowering local initiatives (Hoppe and van Bueren, 2015). Rather than suggesting that one approach is correct, this study reveals that both are necessary and, if used properly, can lead to meaningful change. There are instances where the government is required to support local initiatives, to lead projects, to facilitate, and to enforce; the good practices discussed highlight these different roles.

An observation made was that the main quantitative indicator system for local climate action in The Netherlands, the *Klimaatmonitor* was hardly known nor used. Like many other indicators and rankings it lacks external visibility and strategies to reach the general public (Pires and Fidélis, 2015). Neither did our study reveal any information that data from the monitor were used to inform decision-making in local policy arenas, nor raise general awareness. Not surprisingly, thus far, no quantitative studies have been conducted on the *Klimaatmonitor* database. So, despite the presence of data (although foremost addressing outcome; thus, having obvious shortcomings in terms of links to the policy process (Lehtonen and Kern, 2009) - no methology, conclusions, criteria, or ranking schemes have been developed for Dutch municipalities in order to support them in analysis and decision-making regarding local climate mitigation performance. A further investigation of these data, even just those for CO_2e emissions could provide critical insight into how climate mitigation is actually progressing in the Netherlands.

As such, and given the fact that only few Dutch local governments have signed CoM (Reckien et al., 2018), a major lesson that can be drawn holds that there is hardly any form of (integrated) local climate mitigation monitoring linked to local climate policy processes in the country. In any case, the good practices mapped in this study form no part of it. In sum, the current monitoring practices of local climate action (and performance) in the country do not yet seem to contribute in any serious way to the Paris Agreement.

6. Conclusion

In this paper the main research questions were, (1) "When exploring local climate mitigation action among multiple small- and medium-sized cities, what actions are perceived as good practices?", and (2) "Are there any demonstrable effects linking them to achieving climate mitigation targets, and is this monitored?" The results of the study show that good practices in local climate action foremost reflect upon actions in which municipalities have a role as facilitators, enabling other actors within the municipal boundaries to implement climate actions: public engagement, citizen-led energy cooperatives, municipal actor engagement, company consortia, and project creation. When reflecting on the academic literature on governance of local clime action the 'governance by enabling' form was found to be most prevalent, as it emerged from 76% of good practices discussed, and

46% of all actions in municipal climate documents. Furthermore, it was the view of civil servants working in climate mitigation that facilitation and enabling were the most effective methods available when implementing climate actions. In addition, self-governing actions, those completed on municipal building stock or property, were seen as useful tools for the municipality to lead by example and as a way to establish a foothold for future climate actions within municipal boundaries. As climate actions are expected to be formally embedded in local climate action plans, we also analyzed these. For the cases studies, however, the action plans were found to be incomplete, in particular regarding implementation of climate mitigation actions.

As regards Dutch municipalities achieving climate mitigation targets data available from the *Klimaatmonitor* appear to form the only standardized source on GHG emissions, energy intensity, and renewable energy. However, despite the availability of municipal-level data – although mostly focused on outcome and output indicators - it was not possible to find those for individual projects, and hence relate them to good practices. Therefore, while civil servants discussed projects which they believed represented a good practice within the municipality, quantitative data points to prove it were not found nor used. Indeed, in several cases, civil servants were unaware of their progress according to the *Klimaatmonitor*. In summary, as to date there is not sufficient data to demonstrate good practice in local climate mitigation action. In response, a broader scope was pursued to assess whether those data available could show good practice on a municipal level as opposed to on an individual project level. Such a statistic could potentially be used to quantitatively define frontrunner municipalities, as opposed to what seems to currently be a system of self-proclamation, and inspire those lagging behind their climate targets to collaborate with those which were on track. However, it was not possible to show good practice on a municipal level.

For these reasons it is fair to state that there are no consistent indicators yet in The Netherlands which can link good practices to achieving climate targets. While it was shown that current data cannot prove good practice (i.e. in terms of effectiveness of these good practices in local climate action), the monitoring scheme used (i.e. *Klimaatmonitor*) was discussed and shown that while impressive, it is, as of now, inadequate to determine whether actual local action plan and local climate mitigation actions have an impact on lowering carbon emissions locally.

Given the limitations found in monitoring data, further study is required to find descriptive indicators which could be used to monitor project implementation. Rather than emissions, if clear quantitative metrics could be compiled per project, a base-level understanding could be built around what a municipality is accomplishing on a project level and could be used to assess good practices. Parallel to the lack of concise and clear monitoring indicators is the lack of collaboration between local governments with regard to climate actions. Searching for a clear and useful way for municipalities to share projects, ideas, and collaborate on larger inter-municipal implementation schemes could be a huge step in overcoming this barrier. If done well, this could potentially lead to far more actions implemented and more efficiently.

Acknowledgements

The authors would like to thank the interviewees for their time and effort to participate in the interviews required for the study published in this article. The authors would also like to thank two independent reviewers for their valuable comments and suggestions.

Appendix 1. Detailed descriptions of the identified good practice classes

A1. Public Engagement

Direct public engagement was seen as a crucial role of the civil servants in every interview conducted. During four interviews, public engagement was recounted as good practice: two instances of energy ambassadors and two of community meetings. Both methods of engaging the public yielded positive, if indirect results towards achieving climate targets. However, these strategies require minimal investment from municipal actors be it in time, budget, or direct engagement; once started in earnest, they can begin to self-perpetuate.

In the cases of Almere and Arnhem, local government invested in creating energy ambassadors locally. In the city of Arnhem, where municipal teams focused on engaging citizens already existed, the challenge was to train those teams on climate, whereas, in the city of Almere, the program had to be started from scratch. In both cases, trainings were provided free of charge: presentation skills, sustainability information, other skill development. Both programs started without a large search for citizens interested in becoming ambassadors. Instead, private citizens who had completed climate projects or contacted the municipality directly to get involved in local action were invited. The aim of these programs was not only to educate local communities on climate projects and potential individual savings but also to create an active, direct line between citizens and civil servants. Both municipalities found that when the flow of information came from the municipality directly, that it was ignored and that citizens sought a different option. Hence, the ambassadors became the point of contact and source of climate information for each community. While the direct benefit of spreading ideas for individual climate actions to homeowners was successful, the ambassadors also assisted in building a network of interested citizens which could be called upon for community meetings or other municipal functions. In addition, it led to civil servants having a greater connection to citizens interested in starting or participating in climate projects.

'Energy cafes' or other local meetings were used to activate the community behind climate and sustainability. Civil servants in both the municipalities of Goeree-Overflakkee and Zaanstad have run series of successful meetings in their respective municipalities. The cost was relatively low, between €1000-€2000/meeting requiring between 25 and 40 working hours to organize. When designing each workshop, a specific theme was chosen and advertised not only to the general public but also to civil servants in other municipal departments (if the event is about electric transportation, invite those involved in mobility and infrastructure); their participation lends credibility to the proceedings and inspires the public to take the workshop seriously. Successful meetings centered around individuals participation in small group activities as opposed to large presentations. A presentation can more easily be derailed by a single loud naysayer, whereas, in small groups, that same skeptic will be challenged to listen and understand others' views.

Careful maintenance of relationships and trust within a local climate network was found to be crucial to its success. In the municipality of Arnhem, civil servants were discussing a new project with the grid operator without any immediate implications. However, they did this in the absence of their citizens' network. When the project was reported by the community paper out of context, the local citizens' climate network felt betrayed regardless of the actual details of the project under discussion. The issue was not the

project itself but that the network was not made aware of or involved in the planning process.

Table A1
Lessons learned through Public Engagement.

Develop and maintain concrete aims	Community engagement projects must have a clear definition from the outset: theme, schedule, and goals.
Work with those already interested	Focus on those already motivated to participate.
Monitor and develop available human resources	Including monitoring and maintaining a list of interested private citizens and initiatives within the municipality; without such a list of contacts, ambassadors/coaches programs would have been far more difficult to create.
Get municipality out of the picture	The public mistrusts government. In response, push others into the forefront and keep the municipal role in the background.
Respect the local climate network	Maintain communication and discussion of current and future plans to avoid breaches of trust.

A2. Citizen-Led Energy Cooperatives

According to the Local Climate Action program ('LKA'), citizen-led energy cooperatives have been annually increasing the scale of their climate actions (kplusv, 2015), and ten of the thirteen analyzed municipalities are home to at least one of these co-operatives (Schwencke, 2016). Civil servants in three municipalities (Eindhoven, Groningen, and Haarlemmermeer) stated their interactions with such organizations were good practice. Thematically, these actions follow similar guidelines to those from public engagement but the municipal role differs.

In each case, the municipality was approached for some sort of guidance or support which was then provided to the organization. However, rather than being dependent on the municipality for organization or management, the energy cooperatives maintained their independence, allowing them to pursue their own, individual targets. Developing positive relationships with these organizations built the local government's capacity for action; in the Groningen case members of the cooperatives generally concerned first adopters of new ideas, and provide the social infrastructure for future municipal climate action. Furthermore, dedicated energy cooperatives can conduct their own projects with minimal involvement from the local government: in the city of Eindhoven over 4000 solar panels (about 1 MW) were installed; in the city of Groningen, the project aimed to install 7777 panels (about 2 MW). In such cases, having the knowledge of each organization's goals allowed the municipality to better support the cooperatives when asked.

Table A2
Lessons learned from Citizen-led Energy Cooperatives.

Support of interested parties	Foster and support the community's interest in climate mitigation: be it through a loan, annual support, permitting, or a municipal building for a pilot project.
Monitoring of cooperative goals and development of relationships.	Given the citizen cooperative's ability to implement large projects, their active membership can be involved when developing action plans, implementing policies, and monitoring projects.
Matchmaking – cooperatives becoming a network node	Connect interested parties that contact the municipality regarding similar projects *and* record their information for the future.

A3. Municipal Actor Engagement

Successful climate projects typically involved one or several municipal departments. To adapt, climate actors had to redefine their internal and external roles within the municipal government. Civil servants in both the city of Almere and the city of Nijmegens stated that without a supportive intragovernmental network, climate targets were nearly impossible to achieve. This requirement was echoed by nearly all other climate actors surveyed in some form, but many remained unclear how to cultivate such relationships. As a result, clear strategies were required to engage other civil servants whom were not interested in climate mitigation, emissions reductions, or sustainability.

These good practices were focused around successful experiences building an intragovernmental network. Initially, climate actors began to sit with the department where their work overlapped (e.g. sustainable transport with the transportation department) to learn about their current projects and problems. However, while this made meetings more amicable, the conversation about climate also had to be changed to facilitate productive discussions. Rather than trying to force others to approve climate projects, the language was changed to find synergies where climate projects could fit into and accomplish another department's goal. Barriers were discussed, and climate-oriented projects were used as the means to address them these problems as opposed to casting emissions reductions as the overall goal. In the case of the Almere municipality, a 'disruptive' colleague was converted from the most staunch opponent to the greatest supporter of climate projects through listening, building respect, and successful value framing.

A4. Company Consortia

In nine case studies, the creation of a consortium of companies was considered good practice. While these initiatives represent a broad range of investments by the local government, a number of common steps were followed to establish such groups.

1. Interested parties were contacted, enthused and activated: to start a consortium, interested companies and organizations in the existing municipal network were activated through calls, letters, and word of mouth. They were encouraged to send representatives to a meeting and to invite others from their own respective networks. Commitments are not initially necessary and should not be discussed as this may deter investment.
2. Organization of workshops and meeting: workshop(s) were typically scheduled to begin building a network or businesses focused on climate action. Other municipal departments were invited to participate which, as previously discussed, lended credibility to the proceedings and showed the level of interest across municipal departments. It was found that messaging about business and economic incentives were particularly useful (e.g., where clear business cases exist or that municipality will preferentially accept tenders from this group). While 'climate' is attractive to the public, 'profits' motivate companies.
3. Making commitments: Regardless of the commitment, public requirement was bound to push those who had joined and were

willing to sign and act. This was seen as a crucial step as it binds the group together. In addition, in several cases, future meetings were held at a given company/organization's workplace to showcase their projects. If barriers were encountered, they were directed to the consortium because it was likely that other (business) companies had experienced it previously.

4. Monitoring progress: The consortia did not monitor progress. While several municipalities initially suggested that they would monitor all projects, the time and effort quickly grew beyond the available resources. Members monitoring their own progress was found to be rather common, but this did not build trust.
5. Continuing role: In each case where the consortium resigned a commitment, the municipal actors pulled out of the leading role, becoming a regular member. While the municipality was required to activate the other actors, once initiated these consortia seemed to self-perpetuate.

A5. Project Creation

Large projects may encounter insurmountable barriers and stall: for instance by lack of city council approval, lack of public support, or by passing funding deadlines. However, it was in the Amstelveen case (on electric transportation) and the Nijmegen case (wind turbines), engaging interested external organizations was seen as a useful strategy to push projects to completion. When a business company and a NGO contacted the municipality with interest in running the project, both local governments allowed them to attempt to finish what they themselves could not. By stepping back, both projects were successfully completed with minimal further effort from the local government.

Similar strategies were employed by municipalities in Leeuwarden and Den Bosch cases when attempting to increase the renovation rate of buildings within the municipal boundaries. Civil servants created pilot projects by activating those already interested in renovating their properties. However, in both cases, the residents and housing associations were responsible for the projects; the role of the municipal civil servants was to connect interested parties to those able to deliver solutions. Simultaneous to recruitment efforts, civil servants communicated with contractors and designers who were interested in conducting the renovations. Through building those connections and pre-negotiating rough costs, civil servants knew both the current rates *and* the expense of larger projects.

Publicity was seen as a core element to the success of both projects, and the civil servants worked to publicise their efforts. In the case of Den Bosch, those pilot home owners were encouraged to spread the word through their communities in order to recruit further participation within the community. In the case of Leeuwarden, the press was called to report on the first completed project of the housing association. When the head of the association was considering another project to generate similar positive reporting, the civil servants convinced the association that only a significantly larger-scale project would do so and worked with the director to not only develop the project but also to publicise it.

In both of these instances, interested parties were connected with and wound up driving the projects through completion. And, given their success, such interested parties are more likely to work with the municipality again on another project. For this reason, it was crucial for the climate office to maintain a pipeline of citizens and other actors interested in climate.

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